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Effect of little millet based pulses intercropping in rainfed conditions

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Abstract

A field experiment was conducted at Centre of Excellence in Millets, Athiyandal, Tiruvannamalai district of Tamil Nadu during *khari* 2016 to study the effect of intercropping of little millet with pigeonpea and lablab in two different row proportions (4:1 and 6:1 respectively) on growth and yield. Among the intercropping treatments little millet and pigeonpea intercropped in 6:1 row ratio or 6:1 row ratio little millet + pigeonpea - mothbean sequence produced significantly higher dry matter production, grain weight, grain yield of little millet, pigeonpea and lablab. As regards sole and intercropping systems, yield of little millet, pigeonpea and lablab was highest in sole cropping. Higher little millet equivalent yield (LMEY) was recorded in intercropping of little millet and pigeonpea in 6:1 row ratio with horse gram sequence, as compared to rest of the treatments.

Keywords: little millet, intercropping, yield, LMGEY

Introduction

Little millet (*Panicum sumatrense*) is one of the small millets and is a staple food grain crop for the poor people in the tribal areas of India. It is an annual grass, with culm height of 30-90 cm. height, rather slender, erect or base geniculate, simple or branched, leaves linear, 15 to 50 cm or more in length, 12 to 25 mm broad, gradually tapering from a broad base, glabrous or finely hairy. The crop is well known in Tamil Nadu and grown quite extensively in many parts of the state. Under the present system of cultivation the land and other resources are underutilized. The land use efficiency can be increased efficiently by adopting intercropping system. Intercropping of legumes with cereals is a recognized practice for economizing the use of nitrogenous fertilizers and increasing the productivity and profitability per unit area and time. In intercropping system, the competitive effects between main and intercrop depends on the rooting pattern, canopy structure and days to maturity. The intercropping system of cereals + pigeonpea/legumes were tested and found to be profitable systems (Patil, 2003). The present experiment, therefore was planned to study the competitiveness of short duration little millet with long duration pigeonpea and lablab crops grown in intercropping systems with sequential crops of horse gram and moth bean.

Materials and Methods

A field experiment was conducted at Centre of Excellence in Millets, Athiyandal, Tiruvannamalai district during 2016. The soil of the experimental field was sandy clay loam in texture, medium in organic carbon (0.50 %), and low in available nitrogen (285 kg ha⁻¹) low in available phosphorous (11 kg ha⁻¹) and available potassium (89 kg ha⁻¹) with alkaline reaction (pH 8.3). Total annual rainfall of 1074.7 mm in 47 rainy days. The experiment was comprised of 10 treatments, viz., T₁: Littlemillet sole crop - Horsegram, T₂: Littlemillet sole crop - Mothbean, T₃: Littlemillet + Pigeonpea (4:1) - Horsegram, T₄: Littlemillet + Pigeonpea (4:1) - Mothbean, T₅: Littlemillet + Pigeonpea (6:1) - Horsegram, T₆: Littlemillet + Pigeonpea (6:1) - Mothbean, T₇: Littlemillet + Lablab (4:1) - Horsegram, T₈: Littlemillet + Lablab (4:1) - Mothbean, T₉: Littlemillet + Lablab (6:1) - Horsegram, T₁₀: Littlemillet + Lablab (6:1) - Mothbean. The experimental was laid out in randomized block design with three replications, the little millet variety Co (Samai) 4, was sown with Pigeonpea (Co 7), lablab (Co 13) followed by sequential crops of horse gram (Paiyur 2) and moth bean (TMV 1) pulses crops.. The crop received 44 kg N and 22 kg P₂O₅ ha⁻¹, and no additional dose of fertilizers was used for intercrops. For comparison between treatments, the yields of all intercrops were converted into little millet equivalent yield on prices basis (Tomar and Tiwari, 1999)

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Table 1: Effect of intercropping on growth and yield attributes of little millet

	Treatments	Plant height (cm)	Dry matter production (kg ha ⁻¹)	Total No. of productive tillers plant ⁻¹	No. of grains per panicle	1000 grain weight (g)
T ₁	Littlemillet sole crop - Horsegram	108.0	5700.4	7	242	2.41
T ₂	Littlemillet sole crop - Mothbean	110.3	5689.0	6	234	2.40
T ₃	Littlemillet + Pigeonpea (4:1) - Horsegram	113.9	4714.5	6	235	2.39
T ₄	Littlemillet + Pigeonpea (4:1) - Mothbean	111.6	4686.4	7	234	2.38
T ₅	Littlemillet + Pigeonpea (6:1) - Horsegram	129.5	6543.1	8	250	2.43
T ₆	Littlemillet + Pigeonpea (6:1) - Mothbean	127.6	6352.7	7	248	2.43
T ₇	Littlemillet + Lablab (4:1) - Horsegram	107.8	4365.1	7	242	2.39
T ₈	Littlemillet + Lablab (4:1) - Mothbean	106.8	4165.4	6	230	2.37
T ₉	Littlemillet + Lablab (6:1) - Horsegram	119.4	5421.2	6	243	2.42
T ₁₀	Littlemillet + Lablab (6:1) - Mothbean	120.3	5162.7	7	242	2.41
	SED	5.80	281.4	0.6	19.45	0.19
	CD (P=0.05)	12.11	587.8	1.1	NS	NS

Table 2: Yield and grain equivalent yield of littlemillet as influenced by intercropping

	Treatments	Littlemillet yield (kg ha ⁻¹)		Yield of intercrops (kg ha ⁻¹)	Littlemillet Grain equivalent yield (LMGEY)
		Grain	Straw		
T ₁	Littlemillet sole crop - Horsegram	1340.0	4259.3	-	-
T ₂	Littlemillet sole crop - Mothbean	1365.0	4148.1	-	-
T ₃	Littlemillet + Pigeonpea (4:1) - Horsegram	923.5	3636.8	294.5	1463.5
T ₄	Littlemillet + Pigeonpea (4:1) - Mothbean	954.8	3573.9	308.2	1519.8
T ₅	Littlemillet + Pigeonpea (6:1) - Horsegram	1602.0	4774.1	231.1	2025.7
T ₆	Littlemillet + Pigeonpea (6:1) - Mothbean	1584.1	4655.5	224.4	1995.5
T ₇	Littlemillet + Lablab (4:1) - Horsegram	811.2	3433.2	842.4	1154.3
T ₈	Littlemillet + Lablab (4:1) - Mothbean	802.6	3096.2	1470.6	1128.2
T ₉	Littlemillet + Lablab (6:1) - Horsegram	1162.6	4044.4	1395.2	1321.8
T ₁₀	Littlemillet + Lablab (6:1) - Mothbean	1168.1	3851.9	682.4	1329.9
	SEd	101.3	227.8	-	110.6
	CD (P=0.05)	211.6	475.8	-	237.2

Results and Discussion

Growth attributes like plant height and dry matter production was significantly affected by intercropping. Plant height of little millet was found to be higher at all the stages under the treatment, little millet + pigeonpea - horsegram at 6:1 ratio (T₅) (129.5 cm at harvest) followed by little millet + pigeonpea mothbean at 6:1 ratio (T₆) (127.6 cm at harvest) (Table 1). Among the various intercrops, little millet + pigeonpea at 6:1 ratio (T₅) intercropping system produced higher dry matter production (5954.5 kg ha⁻¹). The yielding ability of a crop is reflected through its yield attributing characters. The yield attributes of little millet like number of productive tillers per hill, number of grains per panicle and 1000 grain weight is found to be increased when intercropped with pigeonpea at 6:1 ratio (Table 1). This might be due to development of better complementary relationship and non-renewable resources like water, nutrients and incoming sunlight. These results are in close conformity with the findings of Rathore and Gautam (2003) [3]. Raghavulu and Rama Rao (1994) [4] revealed significant increase in yield components when foxtail millet was intercropped with pigeonpea at 5:1 ratio as compared to 1:1 row ratio. Higher grain yield of pigeonpea in 6:1 row ratios could be attributed to higher yield attributes and least competition due to better planting arrangement. Significantly the highest grain and straw yields (Table 2) were recorded littlemillet + pigeonpea - horsegram at 6:1 ratio (T₅) (1602 kg ha⁻¹ grain yield and 4774.1 kg ha⁻¹ straw yield, respectively) and it was on par with littlemillet + pigeonpea - mothbean at 6:1 ratio (T₆) (1584.1 kg ha⁻¹ grain yield and 4655.5 kg ha⁻¹ straw yield, respectively). Little millet equivalent yield (Table 2) was calculated for comparing different intercropping combinations. The highest little millet grain equivalent yield (2025.7 kg ha⁻¹) was recorded in 6:1 row ratio of little millet

and pigeonpea - horsegram sequence which was closely followed by 6:1 row proportion (1995.5 kg ha⁻¹) but significantly superior over all other intercropping and sole crop treatments. The higher little millet grain equivalent yield in 6:1 row ratio - horsegram sequence was due to higher yield of little millet and pigeonpea coupled with better utilization of the natural resources by the component crops in intercropping system. Similar results were also reported by Gadhia *et al.* (1993) in 2:1 and Kalaghatagi *et al.* (1995) [2] under 4:2 row ratio in pearl millet + pigeonpea intercropping system. Shashidhar *et al.* (2000) [6] also reported higher finger millet equivalent yield in 4:2 row ratio in finger millet + pigeonpea intercropping system compared to 3:1 and 5:1 row proportions. Based on these results, it may be summarised that to increase the productivity per unit area in little millet intercropping system under rainfed conditions of Tiruvannamalai district, growing of little millet and pigeonpea in 6:1 row ratio with horsegram or mothbean in sequence have been found superior over other intercropping systems and also growing sole crop of little millet alone.

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